

REMARKS

By the present reply, no claims have been added, cancelled or amended. Accordingly, claims 55, 58 and 60–131 are presently pending, of which claims 55, 115 and 116 are the independent claims. Rejoinder of claims 76-114 and 117-131, which presently stand withdrawn from consideration, is respectfully requested pursuant to 37 C.F.R. § 1.141, as discussed in greater detail below. Accordingly, favorable reconsideration and allowance of claims 55, 58 and 60–131 is respectfully requested.

Applicants wish to thank the Examiner for having withdrawn the three previous grounds of rejection under 35 U.S.C. § 102 that were based upon the Fein, Grossman and Carmichael references.

Allowable Subject-Matter

Applicants also wish to thank the Examiner for the indication that claims 63-65 recite allowable subject-matter and would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims.

35 U.S.C. § 103: Grossman in view of Nodwell

The Examiner has rejected claims 55, 58, 60-62, 66, 69-71, 75, 115 and 116 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,963,783 to Grossman ("Grossman") in view of U.S. Patent No. 4,027,185 to Nodwell et al. ("Nodwell").

Applicants respectfully submit that the proposed combination of Grossman and Nodwell does not satisfy the requirements for a finding of obviousness of independent claims 55, 115 and 116 as amended in Applicants' previous Amendment/Reply.

In Applicants' previous Amendment/Reply filed October 8, 2008, Applicants presented detailed reasons why the proposed combination of Grossman and Nodwell failed to render independent claims 55, 115 and 116 obvious, having regard to the objective framework for obviousness set forth in *KSR International Co. v. Teleflex Inc.* and *Graham v. John Deere Co. of Kansas City*. Having reviewed the Final Office Action, Applicants respectfully maintain and reiterate all of the submissions presented in the October 8, 2008 Amendment/Reply. For conciseness, Applicants have not repeated those previous arguments in their entirety herein, but respectfully request the Examiner to re-consider those arguments.

Rather, in the present Amendment/Reply, Applicants have clarified aspects of their previous arguments which the Examiner does not appear to have considered or addressed in the present Final Office Action, and have presented new supplemental arguments of non-obviousness.

1) The Proposed Combination would Render Grossman Unsatisfactory for its Intended Purpose

From the "Response to Arguments" contained on pages 2-3 of the present Office Action, the Examiner appears to have understood the Applicants to have argued that the Grossman and Nodwell references should not be considered in combination because the Grossman and Nodwell lamps have different principles of operation.

Applicants respectfully believe that the Examiner may have misunderstood Applicants' previous submissions in this regard. Applicants are not merely arguing that the Grossman and Nodwell references should not be considered together because their lamps have different principles of operation. Rather, Applicants respectfully submit that the mercury vapor lamp disclosed in the Grossman reference cannot be modified to include the flow generator of the plasma arc lamp disclosed in Nodwell, because the flow generator of Nodwell

would render the Grossman lamp inoperative or unsuitable for its intended purpose.

Applicants respectfully agree with the following statement of principle appearing in the heading of M.P.E.P. § 2143.01.V:

"THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR
ART UNSATISFACTORY FOR ITS INTENDED PURPOSE."

In this regard, it is well-established in U.S. law that if a proposed modification would render the prior art "unsatisfactory for its intended purpose", such a proposed modification cannot support a finding of obviousness: *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984), cited in M.P.E.P. § 2143.01.V.

The intended purpose of the Grossman mercury vapor lamp is to provide radiation having a sufficiently narrow spectral bandwidth to excite only a single Hg isotope of interest, without exciting other isotopes. To achieve this, Grossman circulates water at a controlled temperature in a region defined between an outer surface of a lamp envelope 2 and an outer jacket 3. The controlled temperature of the circulating water controls the temperature of the lamp envelope 2, thereby controlling the equilibrium vapor pressure within the lamp. Grossman uses this method to prevent variations in the vapor pressure of mercury within the lamp, thereby controlling the bandwidth and intensity of emitted radiation to achieve a sufficiently narrow spectral bandwidth to avoid excitation of other undesired isotopes. (Col 1 lines 6-50; col. 2 lines 35-51; col. 4 lines 24-27, 49-56 and 65-67.)

The Examiner has not explained the manner in which he proposes to insert the flow generator of the Nodwell plasma arc lamp into the Grossman mercury vapor lamp. Therefore, Applicants have addressed two possibilities.

1)(a): Directly substituting the flow generator of Nodwell into Grossman, resulting in a vortexing flow of liquid on the inside surface of the envelope 2

The flow generator structure of Nodwell includes the anode structure 24, comprising the annular chamber 39 through which coolant is introduced under pressure through inlet 40 (col. 4, lines 50-55). Thus, in Nodwell, the flow generator is integral with the anode itself. Therefore, substituting the Nodwell flow generator into Grossman would require replacement of one of the Grossman electrode structures with the anode structure 24 of Nodwell. The anode structure 24 of Nodwell, and in particular the annular chamber 39 through which coolant is introduced through inlet 40, would then circulate a vortexing flow of liquid on the inside surface of the envelope 2 in which the mercury vapor is contained. The Grossman lamp would not be capable of functioning for its intended purpose under these conditions. In Grossman, the envelope 2 containing the electrodes 6 is necessarily sealed, in order to preserve the mercury vapor contained within the envelope 2 that Grossman requires for its operation (col. 3, lines 44-50; claims 1 and 11). However, modifying Grossman to include the flow generator of Nodwell would mean that the envelope 2 could no longer be sealed, because the flow generator structure of Nodwell requires the coolant inlet 40 through which coolant is introduced under pressure; Grossman would also have to be modified to provide a water outlet at the end of the lamp opposite from the flow generator. Having a circulating flow of liquid coolant along the inside surface of the inner discharge envelope 2, provided by the flow generator of Nodwell, would lower the pressure of the mercury vapor to a level too low for the lamp to operate properly. In addition, the liquid coolant flow on the inside surface of the envelope 2 would carry the mercury vapor out of the envelope 2, leaving no mercury vapor left to be excited. Thus, if the Grossman lamp was modified to include the flow generator of Nodwell, the Grossman lamp would be incapable of producing the desired narrow-band radiation, or any radiation. In other words, such a modification of Grossman would result in a mercury vapor lamp that could not function at all, let alone in a manner satisfactory for its intended

purpose. Therefore, as noted above, such a proposed modification cannot be relied upon to support a finding of obviousness.

1(b): Performing an unspecified further modification of Grossman and Nodwell, to somehow use the Nodwell flow generator to produce a flow of liquid between the lamp envelope 2 and the outer jacket 3

Alternatively, if the Examiner intended a further modification (not specified in the Office Action), by which the Nodwell flow generator was somehow modified and adapted to produce a flow of liquid in the space between the envelope 2 and the outer jacket 3 of Grossman (the same space in which the inlet 7 stream flows in Grossman), rather than inside the envelope 2, the Grossman lamp would be rendered unsatisfactory for its intended purpose in another sense. As discussed above, the purpose of the Grossman lamp is to control the linewidth and intensity of radiation produced by excited mercury, which is directly affected by the partial pressure of mercury vapor in the lamp. Grossman therefore seeks to indirectly control the mercury vapor pressure inside the envelope 2 by controlling the temperature of the outside surface of the envelope 2, by directing the inlet 7 stream of cooling liquid through the space defined between the outside surface of the envelope 2 and the inside surface of the outer jacket 3. However, the flow generator of Nodwell is a high-velocity flow generator, which produces a vortexing flow of liquid along the inside surface of the Nodwell arc chamber 22, the velocity of the liquid flow having both a longitudinal and a tangential (circumferential) component. As a result, centrifugal force in a radially outward direction causes the vortexing liquid flow to assume the form of a hollow cylinder of liquid in contact with the inside surface of the Nodwell arc chamber 22. If such a flow generator were to be substituted for the stopper 4 of Grossman with its opening for the inlet 7 stream, then the existing inlet 7 stream would be replaced by a high-velocity flow of liquid, in which centrifugal force would cause the vortexing liquid flow to form a hollow cylinder on the inside surface of the outer jacket 3. The vortexing liquid flow would *not* be in physical contact with the *outer* surface of the envelope 2, due to outward centrifugal

force. Therefore, such a modified Grossman lamp would lose its ability to control and regulate the temperature of the envelope 2, thereby losing its ability to control and regulate the mercury vapor pressure inside the envelope, thereby losing its ability to control the linewidth and intensity of the desired narrow-band radiation. Therefore, such a modification would render the Grossman lamp incapable of achieving its intended purpose. Accordingly, as noted above, such a proposed modification cannot be relied upon to support a finding of obviousness.

Summary Regarding the Proposed Modification Rendering Grossman Unsatisfactory for its Intended Purpose

As shown above, any attempt to modify the Grossman mercury vapor lamp to include the flow generator of Nodwell would render the Grossman mercury vapor lamp unsatisfactory for its intended purpose. Therefore, as noted above, such a proposed modification cannot be relied upon to support a finding of obviousness.

If the Examiner disagrees with the Applicants' conclusions above, the Examiner is respectfully requested to explain in detail how he believes the Grossman mercury vapor lamp could be modified to include the flow generator of the Nodwell plasma arc lamp, without rendering the Grossman lamp unsatisfactory for its intended purpose. Otherwise, the Examiner is respectfully requested to withdraw the rejection of the independent claims under 35 U.S.C. § 103(a).

2) No "Apparent Reason to Combine" with "Rational Underpinning"

Under the preceding heading, it has been shown that it would be impossible to modify the Grossman mercury vapor lamp to include the flow generator of the Nodwell plasma arc lamp, as such a modification would render the Grossman lamp inoperative or unsuitable for its intended purpose.

However, even if Grossman could be modified to include the flow generator of Nodwell, there is no apparent reason why one of ordinary skill in the art would make such a modification.

In this regard, in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 82 U.S.P.Q. 2d at 1396 (2007), the United States Supreme Court held that a finding of obviousness requires:

“an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit. See *In re Kahn*, 441 F. 3d 977, 988 (CA Fed. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).” [emphasis added]

In the Final Office Action, the only reason asserted by the Examiner for modifying the Grossman reference to include the flow generator of Nodwell is “for the purpose of efficiently generating the flow of liquid”.

However, a careful review of the Grossman and Nodwell references reveals that the use of the Nodwell flow generator in the Grossman lamp would not be more efficient in generating the flow of liquid. On the contrary, the use of the Nodwell flow generator would be grossly inefficient for the purpose of the Grossman lamp. Therefore, there is no “rational underpinning” to the reason asserted by the Examiner for combining the Grossman and Nodwell references as required by KSR.

Detailed descriptions of the Grossman and Nodwell references were provided in Applicants’ previous Amendment/Reply and are therefore not repeated herein, for conciseness.

The purpose and function of the water flow generator structure in Grossman are very different from the purpose and function of the water flow generator structure in Nodwell, as explained below. As a result, there would be no reason to use the flow generator of Nodwell's plasma arc lamp in the mercury vapor lamp of Grossman.

In Grossman, the purpose of the water flow is to control and maintain the temperature of the lamp envelope 2 at a desired temperature, in order to control the mercury vapor pressure within the envelope. The Grossman lamp is not a plasma arc lamp like Nodwell's, but rather, is merely an electroded mercury vapor lamp. The power levels of the Grossman lamp are relatively low: the input power for the electroded mercury vapor lamp shown in Table 1 is 75 Watts (column 5, line 65), and the greatest power level disclosed in Grossman appears to be 149 Watts (Fig. 2). As a result, the temperature of the Grossman lamp is relatively low, apparently ranging from 19 to 50°C (col. 7, lines 22-23), with a desire to maintain the temperature below 35°C (col. 6, lines 66-67). Even the three microwave lamps shown at the top of Table 1 (col. 5, lines 57-64), which appear to lack the water-cooling system of the Grossman electroded lamp invention shown at the bottom of Table 1 (col. 5, lines 65-67), do not appear to exceed operating temperatures of 50°C. As a result of the relatively low lamp operating temperatures involved in Grossman, the water flow in Grossman is only required to remove a relatively low amount of heat energy from the lamp envelope 2: during normal operation, the temperature of the flowing water is only about 2°C cooler than the temperature of the lamp envelope 2 (col. 5, lines 16-20).

In contrast, in Nodwell, the purpose of the vortexing flow of water is to cool the periphery of a gas column through which a high-temperature plasma arc is discharged, thereby constricting the diameter of the arc, and thus imparting a positive dynamic impedance to the arc (col. 1, lines 62-64; col. 2, line 66 – col. 3, line 6). Nodwell's plasma arc lamp has a disclosed power of 140,000 Watts (col. 5, line 43), roughly 1000 times more powerful than the highest power of 149 Watts disclosed by Grossman. The temperature of such an arc

is typically in the range of 10,000° C or higher, many thousands of degrees hotter than Grossman's lamp temperature of 19 to 50°C. Thus, the temperature difference between the vortexing flow of water in Nodwell and the plasma arc that it is cooling is thousands of times greater than the 2°C temperature difference between Grossman's lamp envelope 2 and the water flow that is cooling it. As a result, the vortexing flow of water in Nodwell is required to remove vastly larger amounts of heat energy per unit time than the water flow in Grossman, requiring vastly higher water flow rates than Grossman.

The flow generator of Nodwell is designed to cool and constrict a high-temperature plasma arc. The Grossman mercury vapor lamp does not produce a plasma arc. Therefore, there would be no reason for one of ordinary skill in the art to attempt to modify the Grossman lamp to include the Nodwell flow generator, because there is no plasma arc in the Grossman lamp that would require the cooling effect of the Nodwell flow generator.

In addition, the flow generator of Nodwell uses vastly greater water flow rates and velocities than the flow generator of Grossman, because the Nodwell flow generator is required to cool and constrict a plasma arc having a temperature on the order of 10,000 °C or higher, whereas the Grossman flow generator is only required to cool a vapor lamp envelope having a temperature of no more than about 50 °C. There is absolutely nothing in Grossman to suggest that its own water flow generation system is in any way inadequate. Therefore, it would be vastly wasteful and inefficient to modify Grossman to include the Nodwell flow generator, which would provide vastly greater water flow rates and velocities than would be required for the purpose of the Grossman vapor lamp. In other words, even if it were possible to modify the Grossman lamp to include the Nodwell flow generator, such a modification would result in a lamp that is vastly less efficient than the lamp as disclosed by Grossman, using vastly greater amounts of energy and water than necessary.

Therefore, there is no "rational underpinning" to support the reason asserted by the Examiner for modifying Grossman to include the Nodwell flow generator, which was "for the purpose of efficiently generating the flow of liquid." On the contrary, if such a modification of Grossman were possible, this modification would vastly decrease its efficiency. Accordingly, as there is no "articulated reason with some rational underpinning" as required by KSR, there would not have been any apparent reason to modify Grossman as suggested by the Examiner. Therefore, the Grossman and Nodwell references fail to satisfy the requirements for a finding of obviousness set forth in KSR. Applicants therefore respectfully request that the rejection of the independent claims be withdrawn.

3) The Proposed Combination would Not Arrive at the Claimed Invention In the Fashion Claimed by the Patent at Issue

In KSR, the United States Supreme Court held that a finding of obviousness requires not only an "apparent reason to combine" the elements of the references, but also requires an apparent reason to combine those elements "in the fashion claimed by the patent at issue."

On pages 26-27 of Applicants' previous Amendment/Reply filed October 8, 2008, the Applicants pointed out that even if Grossman could be modified to include the flow generator of Nodwell, such a combination would still not arrive at the claimed invention. For example, such a combination of Grossman and Nodwell would fail to include an "electrically insulated flow generator [which] comprises an electrical conductor and electrical insulation surrounding said conductor", because neither Grossman nor Nodwell discloses this feature of independent claim 55. As explained in greater detail in Applicants' October 8, 2008 Amendment/Reply, regardless of the manner in which the elements of Grossman and Nodwell are to be combined, no such combination would provide this feature of independent claim 55.

The Examiner has not addressed this submission in the present Final Office Action. The Examiner is therefore respectfully requested to either explain in detail how the proposed combination of Grossman and Nodwell would include this feature of claim 55, or withdraw the rejection of the independent claims.

Dependent claims

The foregoing submissions apply equally to independent claim 55 and to independent claims 115 and 116, which recite limitations similar to those of claim 55 emphasized above.

Claims 58, 60-62, 66, 69-71 and 75 are directly or indirectly dependent upon claim 55. Applicants therefore respectfully submit that each of these claims is allowable due to its dependency, as well as the additional subject-matter that it recites.

35 U.S.C. § 103: Grossman and Nodwell with Other References

The Examiner has also rejected the following dependent claims, over Grossman by itself or in combination with other references:

- Claims 67 and 68 are rejected as being unpatentable over Grossman in view of Nodwell and in further view of U.S. Patent No. 5,753,106 to Schenck;
- Claim 72 is rejected as being unpatentable over Grossman in view of Nodwell and in further view of U.S. Patent No. 6,621,199 to Parfeniuk;
- Claim 73 is rejected as being unpatentable over Grossman in view of Nodwell and in further view of U.S. Patent No. 5,137,659 to Ashley; and
- Claim 74 is rejected as being unpatentable over Grossman in view of Nodwell and in further view of U.S. Patent No. 6,465,799 to Kimble.

Claims 67-68 and 72-74 are directly or indirectly dependent upon claim 55. Applicants therefore respectfully submit that claims 67-68 and 72-74 are

allowable due to their dependencies, as well as the additional subject-matter that each of these claims recites.

Election / Restrictions: Request for Rejoinder of claims 76-114 and 117-131

Rejoinder of claims 76-114 and 117-131, which are presently pending but withdrawn from consideration, is respectfully requested pursuant to 37 C.F.R. § 1.141.

In this regard, claims 76-114 and 117-119 are directly or indirectly dependent upon independent claim 55, while claims 120-131 are directly or indirectly dependent upon independent claim 116.

Applicants respectfully submit that independent claims 55 and 116 are both generic to all relevant species to which their dependent claims 58, 60-114 and 117-131 pertain, and therefore, claims 55 and 116 are both linking claims as discussed in M.P.E.P. § 809.03. As independent claims 55 and 116 have been shown to be allowable, applicants respectfully request that their dependent claims 76-114 and 117-131 be rejoined in this application and allowed, pursuant to 37 C.F.R. § 1.141.

Fee Authorization

The Commissioner is hereby authorized to charge any fees that may be required, including any fees for extensions of time, or credit any overpayment, to our deposit account no. 11-1410.

Conclusion

In view of the foregoing, Applicants respectfully submit that the present application is in condition for allowance, and respectfully request that a Notice of Allowance be issued.

Applicants respectfully note that since the present application was filed on Feb. 12, 2004, the Examiner has issued five Office Actions on the merits (seven Office Actions in total). The five Office Actions on the merits have cited various combinations of references stemming from four successive searches of the prior art conducted by the Examiner. Applicants respectfully submit that the Examiner has done a thorough and commendable job of searching for prior art pertinent to the present application, and respectfully submit that no further searching is required. Should the Examiner accept the foregoing submissions, Applicants respectfully request timely allowance of the present application.

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

Should there be any questions concerning this application, the Examiner is respectfully invited to contact the undersigned agent at the telephone number appearing below. Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to deposit account No. 11-1410.

Respectfully submitted,

Knobbe, Martens, Olson & Bear

Dated: April 27, 2009

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